MUMBAI

American Center Bulletin

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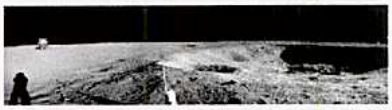
COMMEMORATION OF MOON DAY



On July 20, 1969, the human race accomplished its single greatest technological achievement of all time when a human first set foot on another celestial body.

Six hours after landing at 4:17 p.m. Eastern Daylight Time (with less than 30 seconds of fuel remaining), Neil Armstrong took a "Small Step" into our greater future when he stepped off the Lunar Module, *Eagle*, onto the surface of the moon, from which he could look up and see Earth in the heavens as no one had done before him.

He was shortly joined by "Buzz" Aldrin, and the two astronauts spent 21 hours on the lunar surface and returned with 46 pounds of lunar rocks. After their historic walk on the moon, they successfully docked with the Command Module *Columbia*, in which Michael Collins was patiently orbiting the cold but no longer lifeless moon.

Over the past 50 years, humans have made significant strides in space exploration. What rises above the specific details of these accomplishments, however, is the worldwide effort and cooperation that made them possible. I believe that the growing spirit of collaboration, linked to the growing number of nations and organizations involved in space and the increasing scope of global space activity, will provide the framework required for even greater accomplishments.

The number of countries involved in space exploration has grown from a small, select group beginning in the 1950s to more than 80 nations that today have organized efforts to use space exploration to benefit their societies. The future of space exploration will be grounded in such international involvement and, more importantly, in collaboration among nations to benefit people everywhere.

The history of space exploration is rich. In 1609, people began to explore the heavens visually, thanks to improvements that Italian astronomer Galileo Galilei made to the telescope. Credited with being the first to use the telescope for astronomical purposes, Galileo made it possible to observe mountains and craters on the moon's surface.

In such beginnings, the dream of lunar and planetary exploration was born. Now, 12 men have walked on the moon, and a wide range of unmanned missions to the moon and several planets have been completed. In just the past ten years, 150 planets have been discovered beyond our solar system. Closer to home, world citizens have reaped enormous benefits from space exploration through satellites that support communication, navigation, weather observation, and other remote-sensing disciplines. Space-related technology and scientific knowledge have contributed to high-performance computing and robotics, scratch-resistant eyeglass lenses, breast cancer imaging, and much more.

For the near future, even more ambitious space exploration plans are being developed. With completion of the New Horizons mission, the first spacecraft to visit the dwarf planet Pluto and its moon Charon in 2016-2017, the world's spacefaring nations will have sent robotic spacecraft to all the planets of our solar system. No later than 2020, we expect humans to once

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HOLIDAYS

July 4: Independence Day

A WORD FROM THE CENTER

When Neil Armstrong stepped out of the Apollo 11 Lunar Lander on July 20, 1969, he was fulfilling a dream that visionaries have shared for centuries: Humans had arrived on the moon. This was a huge change from most of human history, when knowledge of space consisted of information which could be detected from Earth. This past May, NASA celebrated another achievement as the Phoenix Mars Lander traveled through the Red Planet's atmosphere and touched down on Mars' northern polar region. Over 90 days, the probe will dig into the permafrost to look for evidence of life.

However, we see that the universe is still immense. After decades of breakthroughs, we still have no hope in the near future of overcoming certain restrictions on the range of exploration. For example, Mars is a reasonable destination for astronauts, Pluto is not. Space exploration is also limited by available resources. A positive outcome of these restrictions is their role in fostering international cooperation. This article will discuss international collaboration and its importance in helping mankind reach its goals and explore the enormous benefits of space exploration.

Kristina Dunne
Assistant Cultural Affair Officer

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again walk on the moon. As the magnitude of space exploration increases, so does international collaborative effort. A good example of early space cooperation is the study of Halley's comet during its approach to the sun in 1986. Five years earlier, in 1981, the space agencies of the Soviet Union, Japan, some European countries, and the United States formed the Inter-Agency Consultative Group (IACG) to informally coordinate matters related to the space missions being planned to observe the comet. In 1986, five spacecraft from these nations rendezvoused with Halley's comet. The vital information exchanged as a result of IACG collaboration was invaluable in studying the comet.

In human spaceflight, international collaboration has grown from the seeds of early programs such as *Skylab*, the Apollo-Soyuz Test Project, and the Space Shuttle-Mir Joint Program, to the current International Space Station effort, one of the most incredible engineering accomplishments in history.

The Apollo-Soyuz Test Project in July 1975, was the first international manned space flight. The mission was designed to test rendezvous and docking systems compatibility for American and Soviet spacecraft and open the way for international space rescue and future joint manned flights.

The Space Shuttle-Mir Joint Program, February 1994 to June 1998, went well beyond the scope of earlier collaborative programs, encompassing 11 space shuttle flights and seven U.S. astronaut residencies, called increments, on the Russian space station *Mir*. Space shuttles also conducted crew exchanges and delivered supplies and equipment. Shuttle-Mir showed that space exploration no longer had to be defined as a competition between nations and helped Americans and Russians develop the expertise to build and maintain the International Space Station.

The International Space Station is the largest international science collaboration in space today. The United States, Japan, Canada, Russia, and 11 countries represented by the European Space Agency have come together to build and inhabit the station. Through the science research carried out there, these nations seek to improve life on Earth and pave the way for future space exploration. The space station partnership has illustrated its strength and commitment with its perseverance through various strains, including aftershocks from the loss of the U.S. space shuttle *Columbia* in 2003.

Such cooperative endeavors serve as inspiration for the future. When great nations seek great endeavors, they find more success with allies and partners. Space exploration is the greatest endeavor of our time.

As much as we can take pride in our past accomplishments, the dawn of a new space age lies ahead. In a relatively short amount of time, I believe the people of Earth will look through their telescopes at the moon to see evidence of human and robotic exploration activity benefiting people everywhere.

They may see a surface research station, manned by an international crew that is working to obtain useful resources from the lunar regolith – a layer of loose rock resting on bedrock – as part of an effort to enable crews to live more independently of Earth. Antennas may be deployed on the far side of the moon that can be linked in phase to form the largest radio telescope ever built, free from the interference of radio noise from Earth. Other astronauts may be geological explorers looking for clues to the origins of the Earth-moon system and life itself. While these activities are taking place, still others may be readying a 500-ton spaceship for humankind's first voyage to Mars.

Already, many nations have initiated lunar exploration efforts. The European Space Agency's Small Mission for Advanced Research in Technology orbited the moon in 2004. Over the next several years, other spacecraft will follow, including the *Selenological and Engineering Explorer* from Japan, *Chandrayan* from India, *Chang'e* from China, and the Lunar Reconnaissance Orbiter and its secondary payload, the *Lunar Crater Observation and Sensing Satellite*, from the United States. Each mission has some degree of international collaboration.

In 2006, the world's spacefaring nations began discussing how they will work together to advance scientific, economic, and exploration progress on the moon. This effort begins now, with the planning and implementation of precursor robotic missions. These interactions are the seeds of future collaborative efforts.

NASA is compiling input from various communities, including international space agencies, to generate a global strategy of lunar exploration objectives. NASA presented this strategy at its Next Generation Exploration Conference, a gathering of emerging global space leaders, in August 2006.

As spacefaring nations come together to develop a vision of common and unique interest in the moon, we lay the groundwork for a momentous leap forward in space exploration. Some among us may see the moon as an end in itself, a unique location from which to investigate the processes that formed our solar system and a nearby location where self-sufficient human settlements may lay the groundwork for people to live and work on other planets. Others may see the moon as a test site for technologies and operational techniques that will someday apply to the human exploration of Mars and other destinations. Still others may view the moon as an incredible resource that may help us solve energy and other problems here on Earth. Lunar exploration that is sustainable over the long term will require the efforts of all of us, with our many views of the role of the moon in human exploration and development.

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When I was an astronaut, I experienced firsthand the benefits of international cooperation in space exploration. I believe in the great value of space exploration for people throughout the planet. Although humankind's first steps onto another world were taken by a dozen early explorers from America, it will take all of our nations, working together, to accomplish the great endeavor of space exploration that lies before us and to enable future generations of explorers to do the things we can only imagine today.

The above article was written by Dr. Scott Horowitz, who is the associate administrator for the Exploration Systems Mission Directorate (http://exploration.nasa.gov) at NASA headquarters in Washington, D.C. A retired U.S. Air Force colonel, Horowitz flew on four space shuttle missions and worked as NASA's Acting Deputy Associate Administrator for Safety and Mission Assurance.

The Top Ten Scientific Discoveries Made During the Apollo Exploration of the Moon

- The moon is not a primordial object; it is an evolved terrestrial planet with internal zoning similar to that of Earth.
- The moon is ancient and still preserves an early history (the first billion years) that must be common to all terrestrial planets.
- The youngest moon rocks are virtually as old as the oldest Earth rocks. The earliest processes and events that probably affected both planetary bodies can now only be found on the moon.
- The moon and Earth are genetically related and formed from different proportions of a common reservoir of materials.
- The moon is lifeless; it contains no living organisms, fossils, or native organic compounds.
- All moon rocks originated through high-temperature processes with little or no involvement with water. They are roughly divisible into three types: basalts, anorthosites, and breccias.
- Early in its history, the moon melted to great depths to form a magma ocean. The lunar highlands contain the remnants of early, low-density rocks that floated to the surface of the magma ocean.
- The lunar magma ocean was followed by a series of huge asteroid impacts that created basins which were later filled by lava flows.
- The moon is slightly asymmetrical in bulk form, possibly as a consequence of its evolution under Earth's gravitational influence. Its crust is thicker on the far side, while most volcanic basins – and unusual mass concentrations – occur on the near side.
- The surface of the moon is covered by a rubble pile of rock fragments and dust, called the lunar regolith, that contains a unique radiation history of the sun, which is of importance to understanding climate changes on Earth.

NOTES FROM THE AMERICAN LIBRARY

A Select Webliography on Space

http://www.aiaa.org/
The American Institute of Aeronautics and Astronautics

http://science.america.gov/science/space/index.html
U.S. Department of State – America.gov – Space Exploration

http://www.fi.edu/learn/hotlists/space.php
The Franklin Institute – Resources for Science Learning

http://spaceflight.nasa.gov/
National Aeronautics and Space Administration – Human Space Flight

http://www.kennedyspacecenter.com/
Kennedy Space Center

http://space.mit.edu/astro_resources.html
Massachusetts Institute of Technology – Kavli Institute for Astrophysics and Space Research

http://www.noaa.gov/satellites.html
National Oceanic and Atmospheric Administration – Satellites

http://nssdc.gsfc.nasa.gov/
National Aeronautics and Space Administration – National Space Science Data Center

http://www.nsstc.org/
National Space Science and Technology Center

http://www.nss.org/
National Space Society

http://www.aerospacemuseum.org/
San Diego Air & Space Museum – Official Air & Space Museum of California

http://www.seti.org/index.php
SETI Institute

http://www.nasm.si.edu/
Smithsonian National Air and Space Museum

http://www.space.com/
Space.com

http://www.spacefoundation.org/
Space Foundation

http://www.spacetechhalloffame.org/
Space Technology Hall of Fame

http://www.ssl.umd.edu/
University of Maryland – Space Systems Laboratory

Note: *Internet sites included in this listing, other than those of the U.S. Government, should not be construed as an endorsement of the views contained therein.*

MUMBAI MONDAYS

A Discussion on
U.S. Independence Day Celebrations
led by Suzanne Yountchi

Monday, July 21
American Center Auditorium **6:00 p.m.**

Suzanne Yountchi joined the Foreign Service in April 2007 as an Economic Officer and is currently serving her first tour in Mumbai. Prior to this, Suzanne spent four years with the Department of State as a Boren Fellow in the Civil Service. Her assignments included Desk Officer for Turkey, Desk Officer for Iraq Political Affairs, and Near East Affairs Officer in the Bureau of Democracy, Human Rights, and Labor. Suzanne has a B.A. in International Relations with a minor in Economics from Lewis and Clark College in Portland, Oregon and a Master's degree in Middle East Studies from the University of Texas at Austin. She grew up in the San Francisco Bay Area and spent two years studying in Istanbul, Turkey. Suzanne is married and speaks Turkish, Azeri, Persian, and French. She enjoys running, cooking, and musical theater. Suzanne will speak about the traditions surrounding the Fourth of July, and will discuss how some of the American customs began, including the music, fireworks, and the "backyard barbeque."

FILMS THIS MONTH

Friday, July 18 *The Right Stuff* (1983, color, 192 mins)

American Center Auditorium **5:30 p.m.**

Friday, July 25 *A Walk in the Clouds* (1995, color, 102 mins)

American Center Auditorium **3:30 and 6:30 p.m.**

This spectacular adventure of the birth of the Space Age and America's Mercury astronauts combines sweeping action, humor and human drama. Sam Shepard, Scott Glenn, Ed Harris, Barbara Hershey and Dennis Quaid star. Written and directed by Phil Kaufman from Tom Wolfe's novel.

From director Alfonso Arau (*Like Water for Chocolate*) comes this lush, romantic drama. Keanu Reeves stars as a newly-returned WWII soldier who agrees to help a woman he befriends on a bus by posing as her husband and meeting her family at their Napa Valley vineyard. As the ruse continues, Reeves falls in love with his "wife" and sets out to prove his worth to her father. Aitana Sanchez-Gijon, Giancarlo Giannini and Anthony Quinn costar.

Exhibition

THE LANDMARKS OF NEW YORK

Premchand and Roychand Gallery
Chhatrapati Shivaji Maharaj Vastu Sangrahalaya
(formerly Prince of Wales Museum, Western India)
July 21-30, 2008

The American Consulate General, Mumbai, and Chhatrapati Shivaji Maharaj Vastu Sangrahalaya cordially invite you to the inauguration of this exhibition on Monday July 21, at 5:00 p.m. The exhibition will be on view from 10:15 a.m. to 6:00 p.m. until July 30, except Monday, July 28.

About the exhibition: In New York City alone, there are 1116 designated landmarks, 104 interior landmarks, nine scenic landmarks, and 84 historic districts, comprising 22,100 properties. This is the largest number of designated landmarks and the most valuable real estate of any city in the United States. This exhibition, documenting some of the most significant and unusual of these properties, has been organized by the Historic Landmarks Preservation Center in New York.

Approximately 80 black-and-white framed photographs with descriptive explanatory text about each landmark will be on display. The text will describe the cultural, historical, and architectural significance of each site.

A few of the landmarks in the photo exhibition include City Hall, St. Paul's Chapel and Churchyard, the Metropolitan Museum of Art, Carnegie Hall, the New York Public Library, the Empire State Building, the Charlie Parker Residence, the Rockefeller Guest House and the Ford Foundation Building.

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Admission to all American Center programs, restricted to persons over 16, will be on a first-come, first-served basis. The auditorium doors will open 30 minutes before the start of the program.